
Nyanza Groundwater Contamination and Indoor Air: How Vapor Mitigation Systems Will Help Affected Homes

This fact sheet was created to answer some of the questions you may have about health issues associated with Nyanza groundwater contamination and questions about vapor mitigation systems.

Introduction

The U.S. Environmental Protection Agency (EPA), in conjunction with the Massachusetts Department of Environmental Protection (MassDEP), has been evaluating potential health issues in your neighborhood related to contaminated groundwater. Chemicals once used in the operation of the former Nyanza Chemical Company at the end of Megunko Road have seeped into the groundwater that flows beneath your area. These chemicals are known as volatile organic compounds (VOCs), which can transfer from groundwater into the gas phase and move through the tiny open spaces between soil particles. This "soil gas" can enter structures through a slab, basement or crawl space walls or floor, particularly when holes or cracks are present in the walls or floor (for example, where utility services enter your home), or through sump pump wells. Soil gas passes more easily through structures with dirt floors but could also pass through an intact poured concrete floor. Once in the structure, the colorless and often odorless vapor may collect in the basement or lowest level of a structure, but may migrate into the upper levels depending on how "tight" the structure is insulated and constructed. These vapors may collect at concentrations that could present potential inhalation risks. This exposure pathway is referred to as vapor intrusion.

During the last several years, and most recently in 2004, EPA collected soil gas and indoor air samples from 14 homes in your neighborhood, as well as from the Town Hall and police department buildings. The indoor air in some of these buildings has been found

to contain detectable levels of trichloroethene (TCE), and other VOCs in a few cases. Based on these results, EPA has concluded that TCE may be present in indoor air at levels that could cause an unacceptable risk of health effects due to long term exposure. Therefore, EPA recommends installing vapor mitigation systems in all of the homes and small businesses located above the most contaminated portion of the groundwater plume.

Vapor mitigation systems work by collecting the chemical soil gases beneath a home or building before they can enter the structure. The gases are then redirected outside and above the structure, where they are dispersed into the atmosphere without posing a health threat. Physically, the system consists of a series of small diameter piping that is connected to a continuously operating fan.

EPA is offering to install vapor mitigation systems in each of the residential and small business structures in the portion of the neighborhood that has the greatest potential for TCE and other VOCs migrating from groundwater to indoor air.

EPA and MassDEP also recommend further evaluation of VOC migration into indoor air of a representative group of additional homes and buildings in the neighborhood that are located throughout the remaining less contaminated portions of the plume.

Health Questions

What VOCs have been found in soil gas and indoor air in homes tested by EPA?

The primary contaminant detected in indoor air is trichloroethene (TCE). TCE is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet burning taste at concentrations much higher than the highest found so far. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

What are potential health effects associated with exposure to TCE?

It depends on the concentration to which you're exposed and how long the exposure lasts. Breathing large amounts of TCE for long periods of time may cause nerve, kidney, and liver damage. There is also some scientific evidence that long term exposure to high levels of TCE may cause an increased chance of developing liver or lung cancer.

Does TCE in indoor air pose an immediate danger to people who live/work in the affected buildings?

No. EPA has evaluated the indoor air data and has concluded that levels are not high enough to pose an immediate threat to public health. TCE levels in homes are much lower than levels that have been associated with immediate or acute health effects. The main concern is that prolonged periods of exposure (30 years or more) to TCE could increase the risk of adverse health effects in some individuals.

Indoor air samples taken over the last several years have shown that exposure levels to TCE in your neighborhood are low relative to existing health based screening levels. For example, the highest level of TCE found in the basement of a home was 38 $\mu\text{g}/\text{m}^3$ (micrograms of TCE per cubic meter of air) compared to the existing screening level of 134 $\mu\text{g}/\text{m}^3$, and is within the proposed screening level range of 2 to 43 $\mu\text{g}/\text{m}^3$. All other TCE results were closer to the lower end of the screening level range. Installing these systems is a prudent public health measure that will eliminate detectable levels of TCE in indoor air. Other adverse health effects may occur from drinking water containing TCE, but since Ashland residents in the area where these chemicals have been found do not drink well water, there is no danger of exposure via this route.

Will I get sick from exposure I may have received during the years I lived in my home?

It is impossible to accurately estimate the TCE levels that people in the neighborhood may have been exposed to over time because we do not have any air data from the neighborhood before the year 1990. The data we have represent exposures that people may have received at the discrete time sampling occurred. There is tremendous variability in air quality among the different homes located throughout the plume area, as well as in each individual home over time. Levels of TCE in indoor air can vary daily based on many variables such as occupant habits, operation of heating and cooling equipment, the elevation of the water table and even atmospheric conditions. There are also many unknowns about an individual's risk factors for cancer or other health effects. Therefore, we are not able to draw definitive conclusions about whether past long-term exposures are associated with cancer or other adverse health effects. However, we do know that concentrations of TCE in some neighborhood homes have been found to exceed proposed health-based screening levels and the estimated cancer and noncancer risks from exposure are higher than background. (Background risks include risks from everyday exposures not related to the Nyanza Site). This finding is based on conservative exposure assumptions such as 30 years of continued exposure to the same level of TCE. EPA believes it is prudent to take action to prevent continued exposures.

Are there any medical tests for adverse health effects due to past exposure?

There are tests available to measure TCE and several of the compounds into which it breaks down in the breath, urine and body tissues, but since this chemical leaves the body rapidly, these tests are only useful if exposure to fairly large amounts of TCE took place within the last few days. However, other chemicals break down into the same products as TCE, so tests that detect these breakdown products can't determine whether the exposure was to TCE or another chemical. Also, there's no test to tell if you will have any adverse health effects in the future due to exposure to TCE.

Can people be exposed in other ways to VOC contaminated groundwater from the Nyanza Site?

No. Contamination was not found at high levels in outside air around the buildings EPA tested. Drinking water for Ashland residents comes from a public drinking water supply that is safe and is not affected by groundwater contamination beneath the residential neighborhood. Contaminated groundwater is not likely to enter public or private water lines since these lines are pressurized and generally located above the water table. Other means of direct contact with groundwater from non-potable wells (such as watering gardens, washing cars and filling swimming pools) are unlikely because the non-potable wells that did exist in the past are no longer used. Direct contact with groundwater that may seep into basements and sump pits during periods of high precipitation is not recommended, however, contact should not result in any adverse health effects.

Vapor Mitigation Questions

How do vapor mitigation systems work?

Vapor mitigation systems, also referred to as subslab depressurization or ventilation systems, are widely used to reduce radon levels in homes and other buildings. They work by collecting gases released by the chemicals from under a basement floor or slab and redirecting the gases outside, where they are dispersed into the atmosphere without posing a health threat. In order for these systems to work effectively, the structure must be generally "sound." That is, a poured concrete floor or slab, or other suitable barrier, must be present and no large holes or cracks should be visible in basement floors or walls. A suitable floor or other barrier will need to be installed in homes with dirt basement or crawl-space floors. Cracks or holes will also need to be sealed. The vapor mitigation system itself will consist of a small diameter vertical pipe, or pipes, installed through the basement or concrete floor that are attached to a series of pipes and a continuously operated in-line fan that are placed outside the home and will direct the vapors above the roof line. A pressure test is used to ensure that the system is effectively drawing air, and hence any vapors, from beneath the entire home or building.

Who will install the system and who will pay for it?

Contractors selected by EPA will install the systems. EPA and MassDEP will pay for all preparatory and system installation costs. These systems generally do not require any routine maintenance, however if repairs to the system resulting from normal use are needed at any time in the future, MassDEP will pay for them. The only cost to the homeowner will be the electricity used to run the fan for the system.

How will I know the system is working properly?

Pressure testing and other performance inspections and quality assurance checks will be conducted throughout the installation process. MassDEP will periodically check and inspect the systems over the long term. These systems will remain necessary until levels of TCE and other VOCs in groundwater are reduced such that they no longer pose a threat of vapor intrusion.

When will the systems be installed?

EPA, MassDEP and their consultant must first inspect the basements and foundations of all homes and buildings where the installation of vapor mitigation systems are planned. EPA plans to conduct these inspection within the next few weeks. Property owners must sign voluntary access agreements in order for EPA, MassDEP and their consultant to inspect, and subsequently install the systems. Preparations and installations are expected to begin this Fall or Winter.

What if I already have a radon system in place?

If you already have a radon system in your home, it should be operated continuously. Your existing system will be evaluated using the same pressure testing and other performance inspections, and quality assurance checks to be conducted on newly installed systems. EPA will perform any necessary system improvements or upgrades.

What if I don't want a vapor mitigation systems installed in my home?

This is a voluntary action and you are not required to take advantage of this program, but you are strongly urged to do so. If you choose not to grant EPA access and allow the installation of a vapor mitigation system, your property will be identified at the state and local level as having a potential health/environmental problem. The Town of Ashland's Board of Health will be notified and will subsequently provide such information to those who inquire about properties for which environmental / health data are contained in public files. If you decide to sell your home, you may be required to disclose this information to potential buyers. Please understand that if you decline the present offer to have a vapor mitigation system installed in your home, at the expense of federal and state government agencies and then change your mind in the future, you will be responsible for the costs of installing and maintaining your own system.

How will the presence of groundwater contamination or the fact that I have a remediation system installed in my home affect the market value of my house?

Property values are most appropriately discussed with real estate professionals knowledgeable about the local economy and other conditions that may influence the value of your home. Keep in mind that the presence of a remediation system in your home to reduce exposure to chemicals found in indoor air may help to avert problems with future property transfers. These systems are very similar to radon mitigation systems which have been widely accepted by the public. The systems will also address any potential radon problem.

Why wasn't this plan put into effect as soon as TCE was detected in indoor air in 1990, 1998 and again in 2004?

The toxicity and potential health effects associated with many chemicals, including TCE, are continually under review by the scientific community. Although TCE was detected in homes and other buildings in 1990 and 1998, the results were well below the health based screening levels in place at that time. In 2001, EPA's scientific experts proposed increasing the toxicity associated with TCE. This change results in lower health based screening levels for TCE, and therefore increased the potential of detecting TCE levels exceeding the proposed lower screening level range for TCE. This proposal has been under review by the academic community and independent scientists since that time. The concentrations of TCE detected in 2004 were similar to levels detected in 1990 and 1998, and do not exceed the established health based screening level for TCE. However, EPA and MassDEP made a conservative decision to further evaluate the results based on the proposed TCE screening levels. EPA performed a detailed evaluation of potential inhalation risks based on the proposed increase in TCE toxicity by applying not only the 2004 data, but the 1998 and 1990 results as well. A thorough evaluation of TCE in groundwater and a detailed inhalation model of the potential movement of TCE from the groundwater into homes and buildings were also performed. These multiple lines of evidence lead EPA and MassDEP to this proactive decision to install vapor mitigation systems.

If you have any questions or want additional information about EPA's work at Nyanza, please contact:

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(While the Ashland Board of Health is cooperating with the EPA's vapor mitigation project, the final decisions and actions will be under the authority of the EPA).

EPA New England website for Nyanza
www.epa.gov/ne/superfund/sites/nyanza